

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION

INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

1 / 13

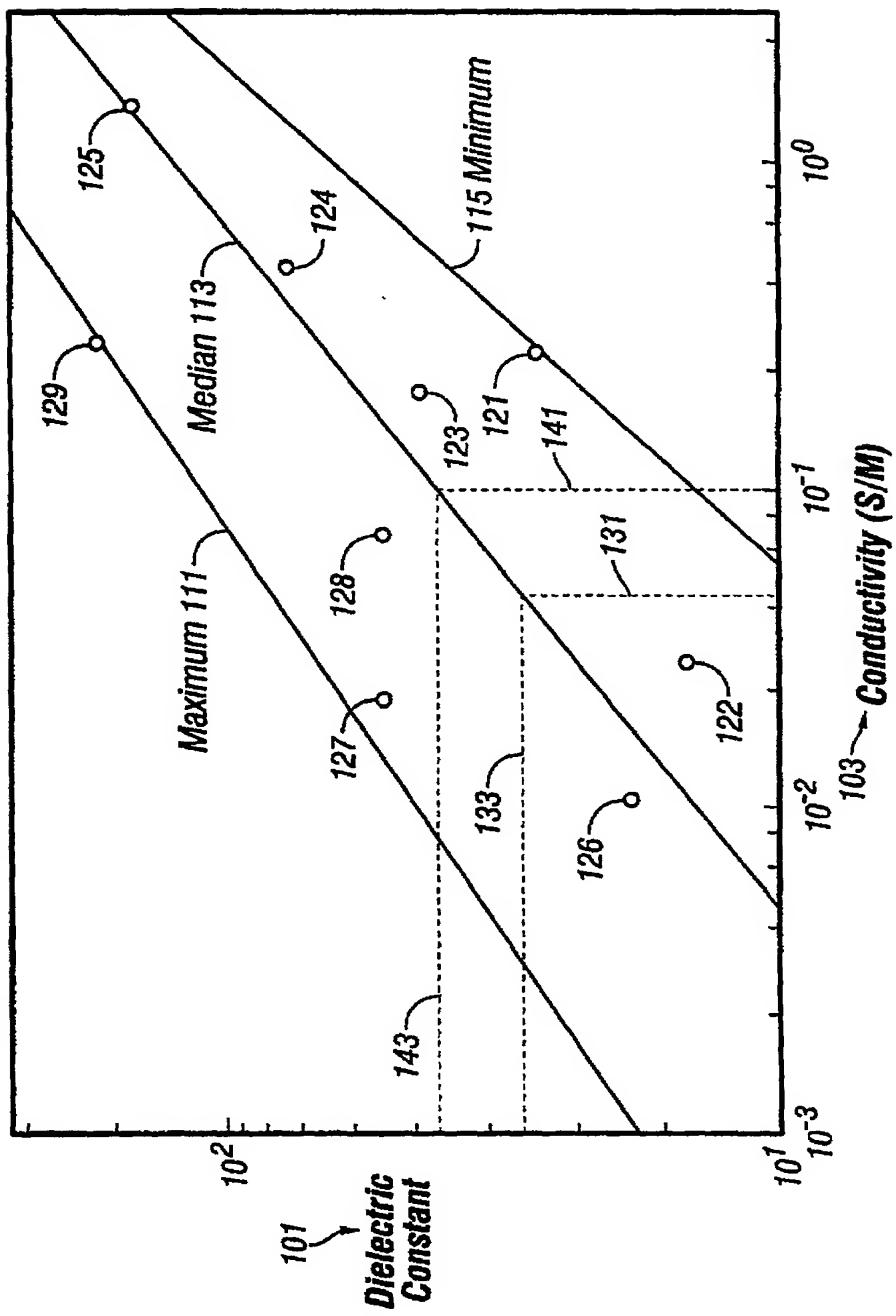


FIG. 1

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR DIELECTRIC VALUES OF AN EARTH FORMATION AS A FUNCTION OF POSITION WITHIN THE EARTH FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

2 / 13

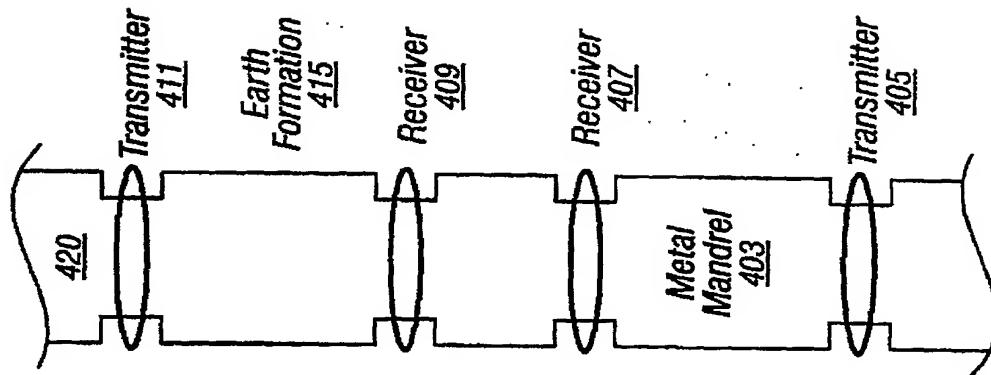


FIG. 4

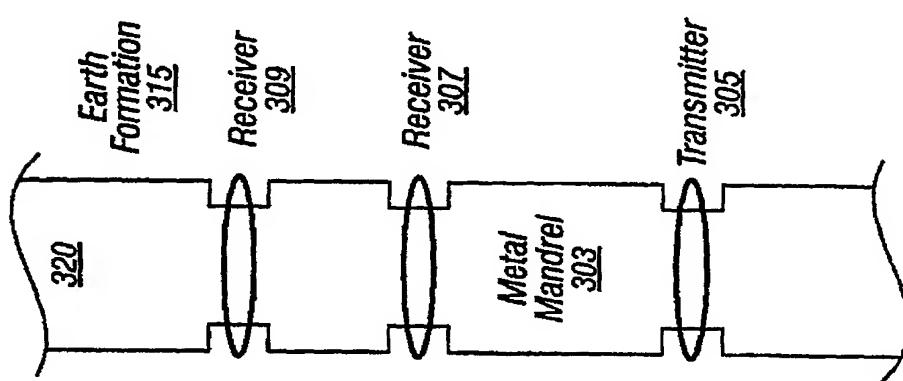


FIG. 3

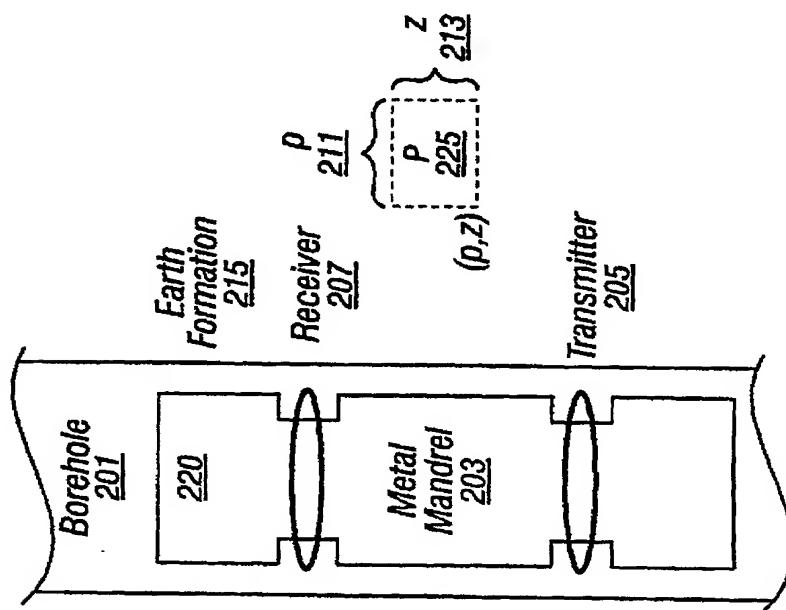


FIG. 2

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

3 / 13

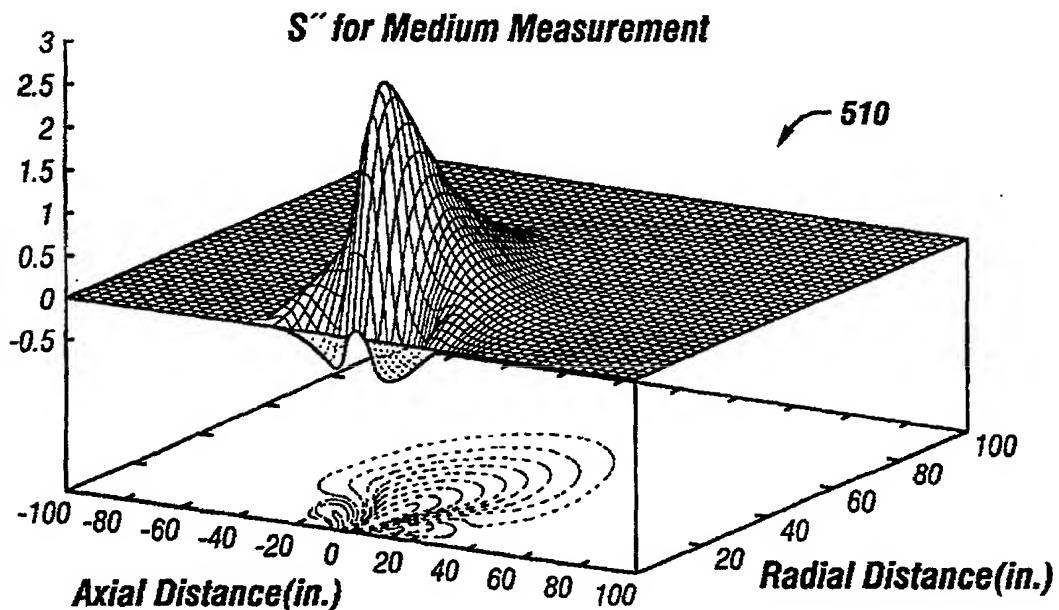


FIG. 5A

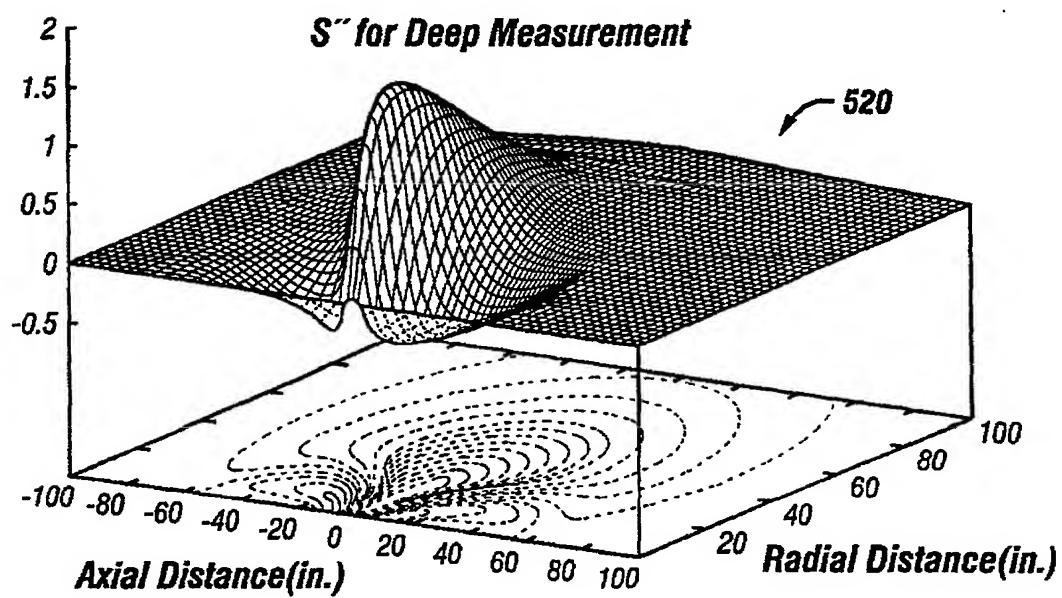


FIG. 5B

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

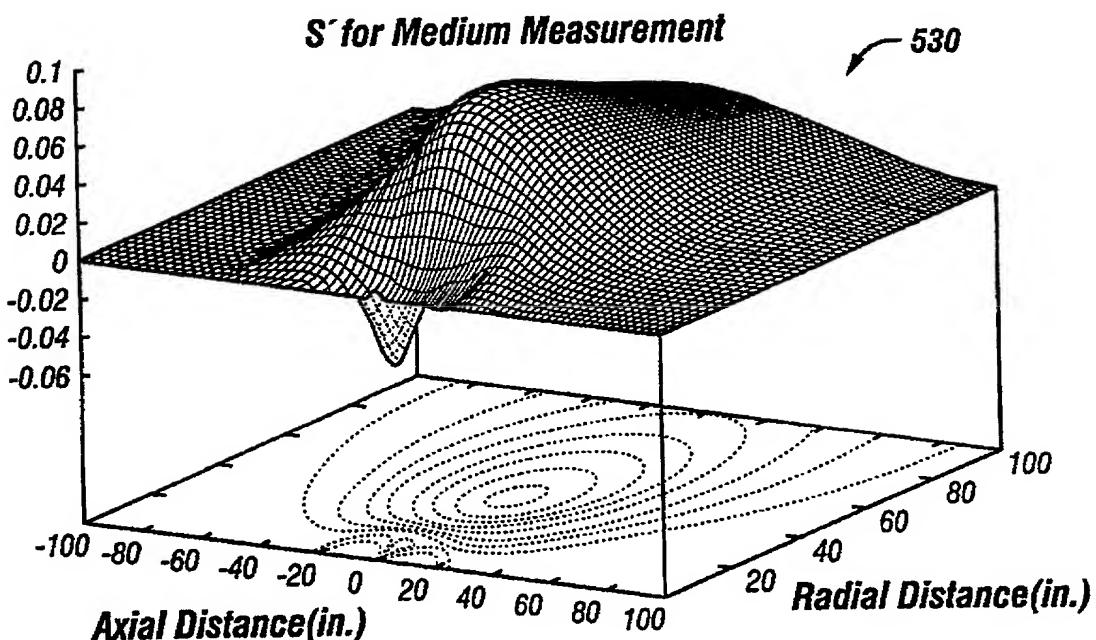


FIG. 5C

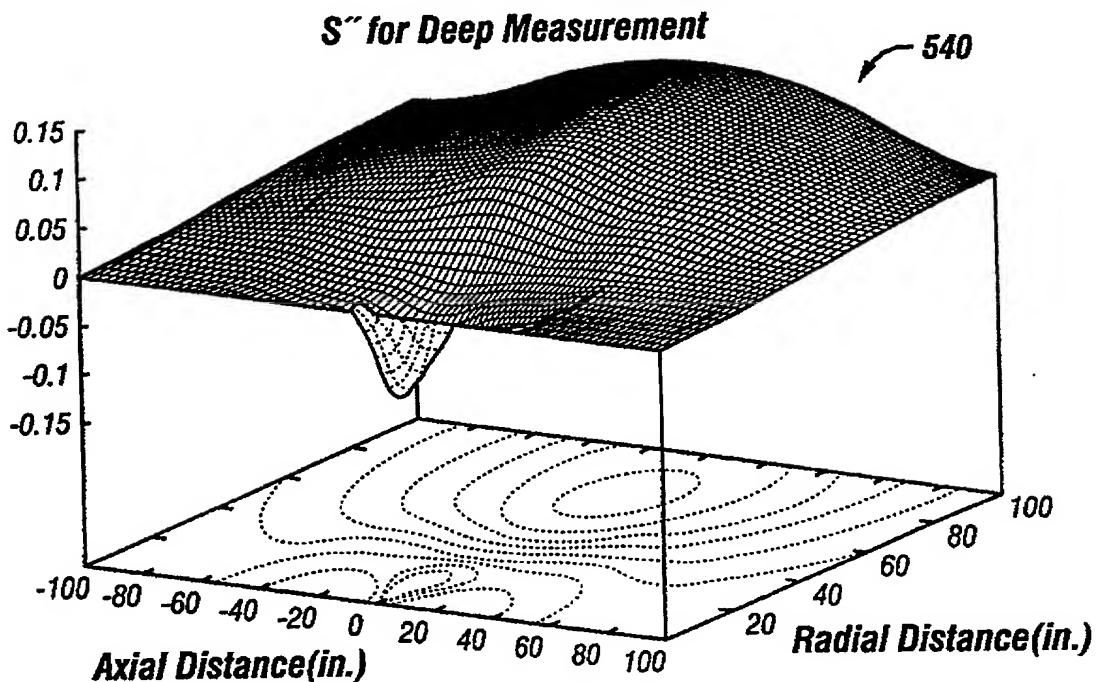


FIG. 5D

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

5 / 13

2003 RELEASE UNDER E.O. 14176

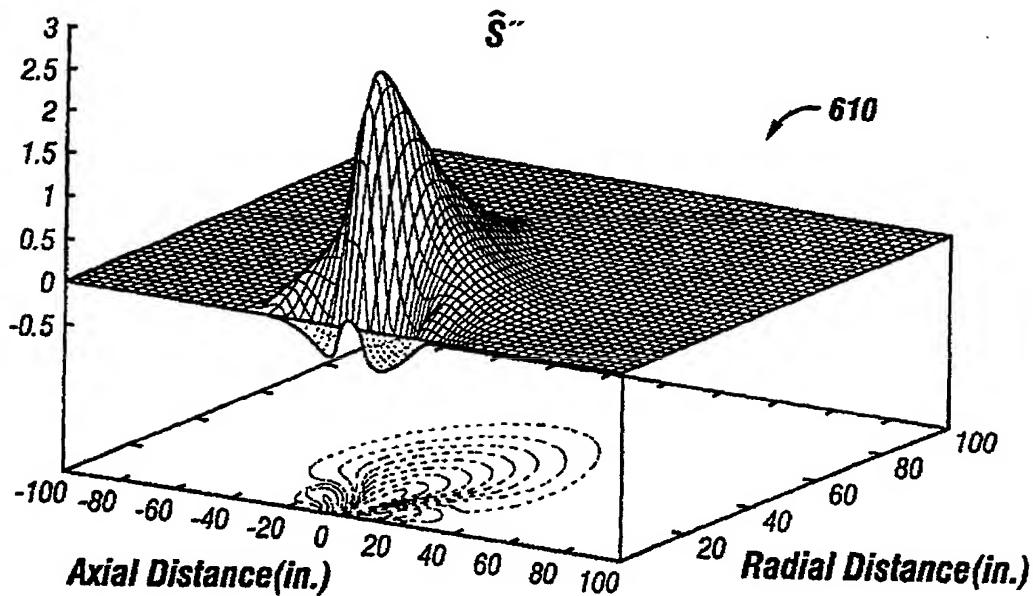


FIG. 6A

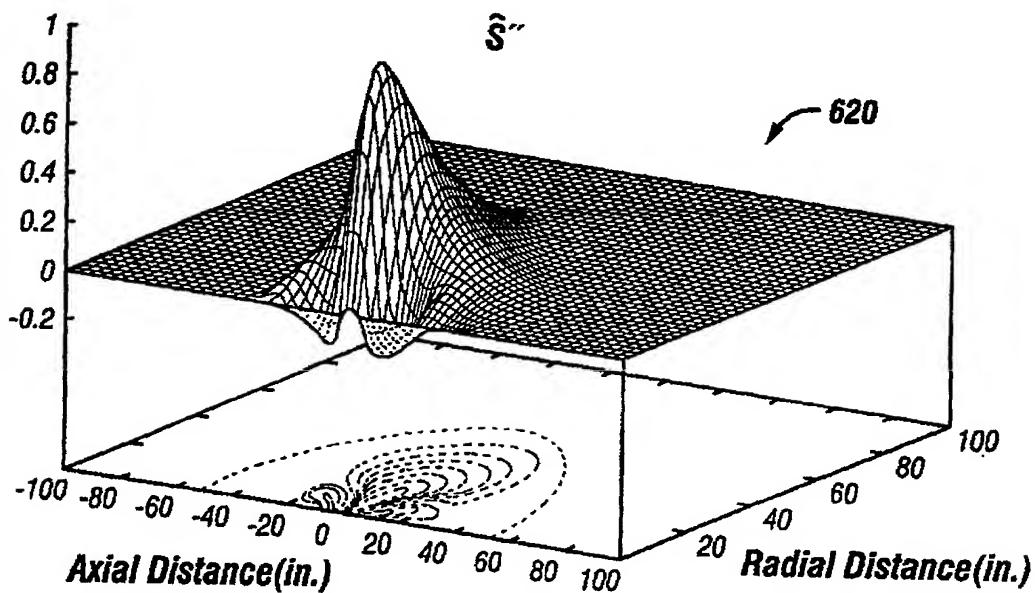


FIG. 6B

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

6 / 13

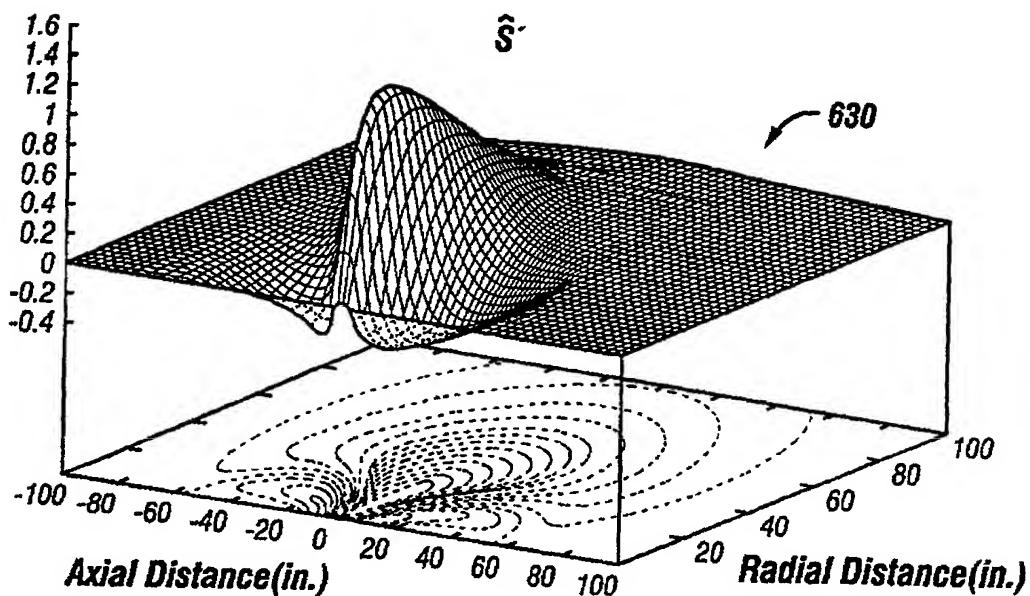


FIG. 6C

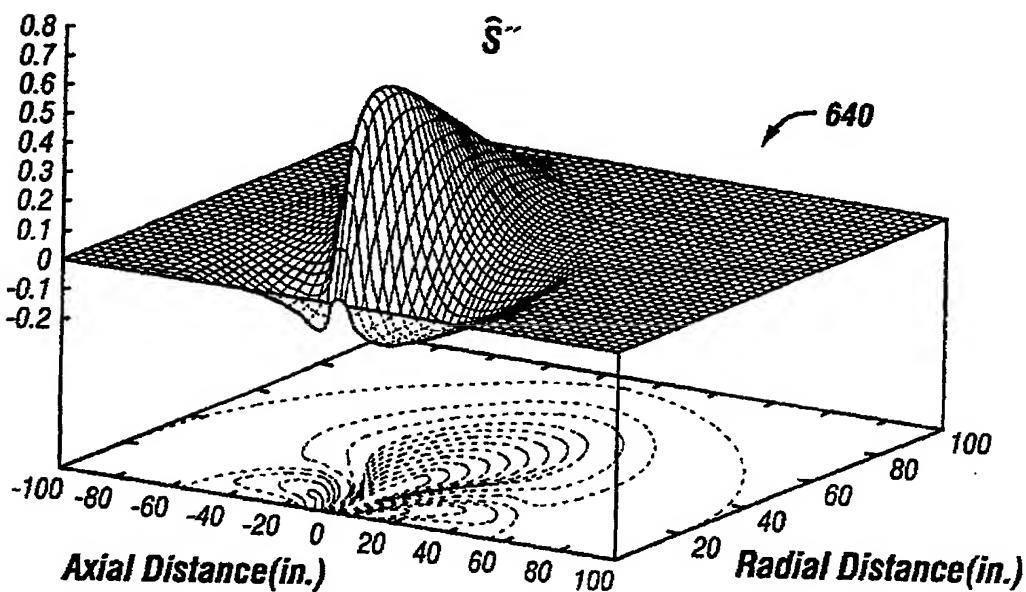


FIG. 6D

10035045 "630" 220 "640" 220

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
 DIELECTRIC VALUES OF AN EARTH FORMATION AS A
 FUNCTION OF POSITION WITHIN THE EARTH
 FORMATION
 INVENTOR: S. Mark Haugland
 ATTY DKT NO: H052722.0029US0

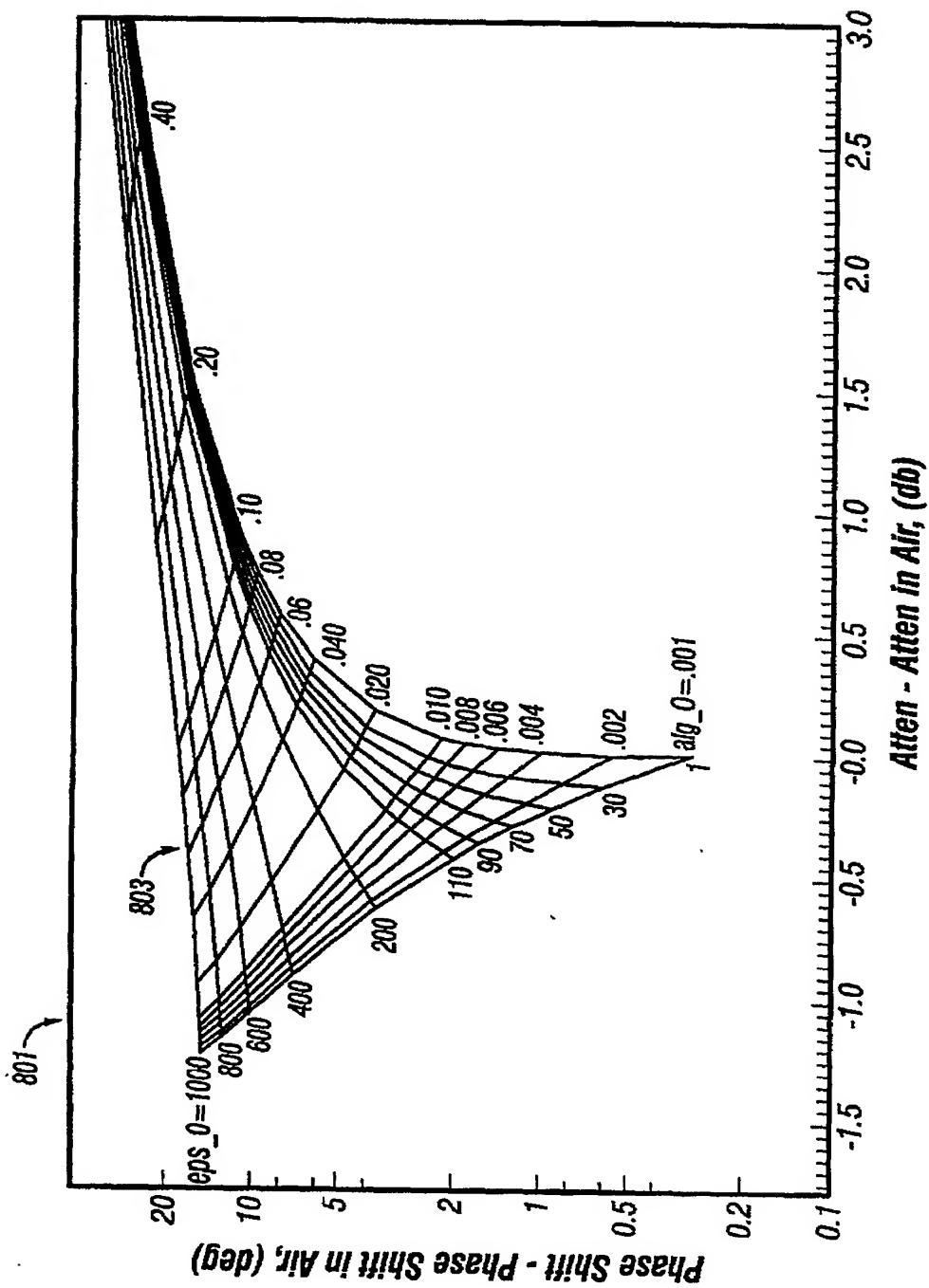
7 / 13

<i>Background</i>	<i>Medium</i>	<i>Deep Measurement</i>		<i>Medium Measurement</i>	
<i>sig0</i>	<i>eps0</i>	<i>I [s']</i>	<i>I [s"]</i>	<i>I [s']</i>	<i>I [s"]</i>
5.000	10.0	-0.159	0.160	-0.155	0.163
2.000	10.0	-0.249	0.255	-0.235	0.261
1.000	10.0	-0.346	0.363	-0.313	0.373
0.500	10.0	-0.476	0.519	-0.400	0.528
0.200	10.0	-0.701	0.833	-0.506	0.810
0.100	10.0	-0.897	1.18	-0.555	1.07
0.050	10.0	-1.09	1.64	-0.564	1.35
0.020	10.0	-1.27	2.39	-0.518	1.70
0.010	10.0	-1.32	3.01	-0.458	1.92
0.005	10.0	-1.32	3.61	-0.397	2.10
5.000	50.0	-0.159	0.160	-0.155	0.162
2.000	50.0	-0.249	0.255	-0.235	0.261
1.000	50.0	-0.347	0.363	-0.314	0.372
0.500	50.0	-0.479	0.517	-0.402	0.527
0.200	50.0	-0.710	0.826	-0.513	0.807
0.100	50.0	-0.923	1.17	-0.573	1.07
0.050	50.0	-1.15	1.61	-0.600	1.35
0.020	50.0	-1.46	2.33	-0.598	1.71
0.010	50.0	-1.17	2.91	-0.593	1.94
0.005	50.0	-1.98	3.41	-0.605	2.12
5.000	100.0	-0.159	0.160	-0.155	0.162
2.000	100.0	-0.249	0.255	-0.235	0.260
1.000	100.0	-0.348	0.362	-0.315	0.371
0.500	100.0	-0.482	0.515	-0.405	0.526
0.200	100.0	-0.721	0.818	-0.523	0.804
0.100	100.0	-0.953	1.15	-0.595	1.06
0.050	100.0	-1.23	1.57	-0.645	1.34
0.020	100.0	-1.68	2.21	-0.699	1.70
0.010	100.0	-2.07	2.63	-0.751	1.91
0.005	100.0	-2.45	2.89	-0.808	2.05

FIG. 7

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

8 / 13



Attenuation in Air, (dB)

FIG. 8

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

9 / 13

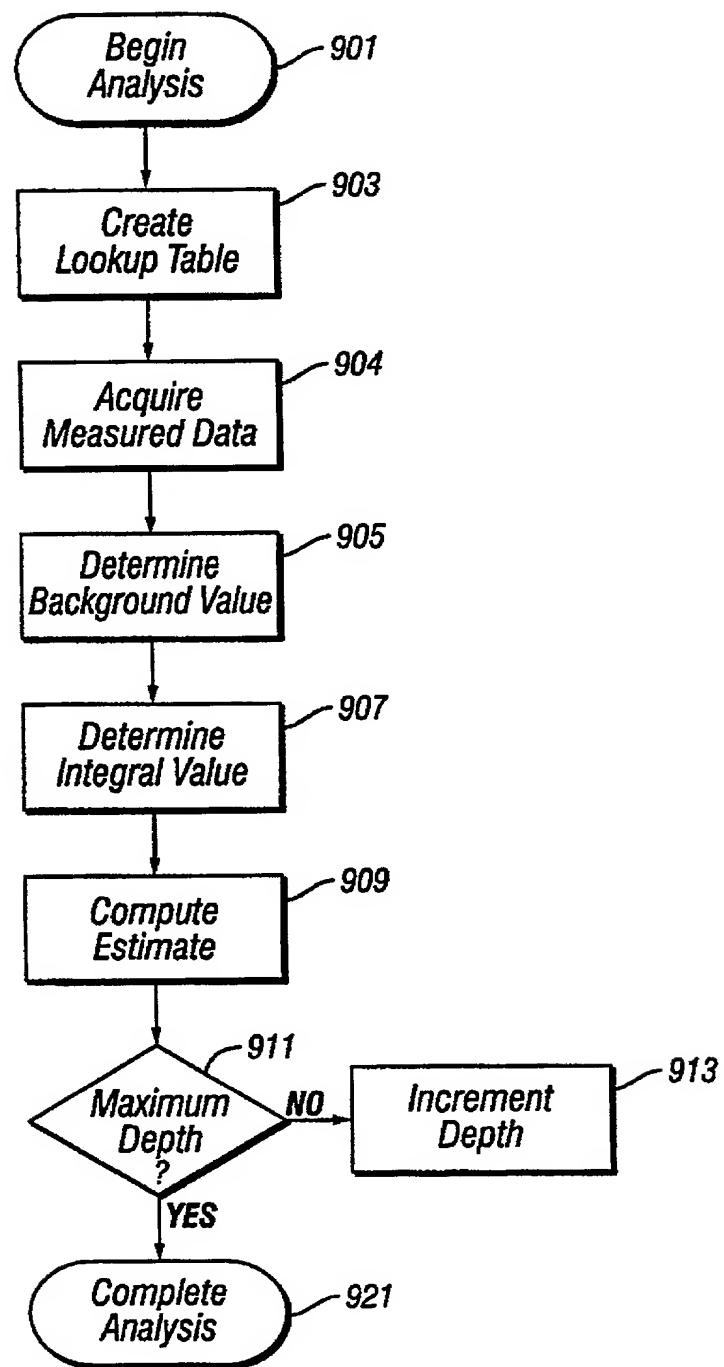


FIG. 9

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

10 / 13

1/sigma	eps_rel	db_pt	db_man	deg_pt	deg_man
0.1	35	16.39681	16.34921	127.5789	126.7759
0.16	35	12.36776	12.35717	100.1192	99.43253
0.26	35	9.218385	9.238105	78.29757	77.74387
0.41	35	6.771087	6.813523	60.93389	60.52257
0.66	35	4.885574	4.94271	47.10585	46.83735
1.05	35	3.450289	3.51429	36.09731	35.96213
1.68	35	2.375379	2.439275	27.35548	27.33459
2.69	35	1.587098	1.645417	20.45383	20.52076
4.31	35	1.023677	1.072881	15.05909	15.18367
6.9	35	0.632716	0.671291	10.90276	11.05577
11.04	35	0.369951	0.398108	7.759132	7.91643
17.67	35	0.198911	0.218012	5.431487	5.576438
28.28	35	9.08E-02	0.10272	3.746272	3.870013
45.27	35	2.41E-02	3.07E-02	2.552769	2.652737
72.47	35	-1.65E-02	-1.36E-02	1.72462	1.802352
115.99	35	-4.11E-02	-4.07E-02	1.160437	1.219516
185.66	35	-5.60E-02	-5.74E-02	0.782376	0.826956
297.18	35	-6.53E-02	-6.78E-02	0.532895	0.566854
475.68	35	-7.12E-02	-7.44E-02	0.37062	0.397166
761.4	35	-7.50E-02	-7.86E-02	0.266387	0.287952
1218.73	35	-7.73E-02	-8.13E-02	0.200079	0.218386
1950.76	35	-7.89E-02	-8.30E-02	0.158176	0.174389
3122.48	35	-7.98E-02	-8.41E-02	0.131809	0.14669
4997.98	35	-8.04E-02	-8.48E-02	0.115262	0.129303
8000	35	-8.08E-02	-8.52E-02	0.104896	0.118408

FIG. 10

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

11 / 13

1/sigma	eps_rel	db_pt	db_man	deg_pt	deg_man
500	10	-1.64E-02	-1.69E-02	0.286526	0.303246
500	12.47	-2.18E-02	-2.26E-02	0.292002	0.309431
500	15.55	-2.86E-02	-2.98E-02	0.299324	0.317704
500	19.39	-3.71E-02	-3.87E-02	0.309207	0.328873
500	24.18	-4.78E-02	-4.99E-02	0.322653	0.344071
500	30.16	-6.10E-02	-6.37E-02	0.341062	0.364877
500	37.61	-7.75E-02	-8.10E-02	0.36638	0.393481
500	46.9	-9.79E-02	-0.1023	0.40128	0.43288
500	58.48	-0.12309	-0.12865	0.449408	0.487148
500	72.93	-0.15417	-0.16101	0.515698	0.561768
500	90.94	-0.19227	-0.20057	0.606764	0.664038
500	113.41	-0.23871	-0.24861	0.731372	0.803555
500	141.42	-0.29495	-0.30651	0.900999	0.992753
500	176.36	-0.36254	-0.37568	1.130442	1.24747
500	219.92	-0.44301	-0.45747	1.438431	1.58746
500	274.25	-0.53778	-0.55303	1.848175	2.036773
500	342	-0.64802	-0.66312	2.387711	2.623872
500	426.48	-0.77442	-0.78801	3.089918	3.38135
500	531.83	-0.91703	-0.92722	3.992076	4.345172
500	663.21	-1.07503	-1.07943	5.134856	5.5534
500	827.04	-1.24665	-1.24246	6.560776	7.044546
500	1031.34	-1.42914	-1.41329	8.312291	8.855778
500	1286.11	-1.61887	-1.5883	10.42983	11.02138
500	1603.81	-1.81159	-1.76358	12.95017	13.57184
500	2000	-2.00282	-1.93525	15.90568	16.53382

FIG. 11

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR
DIELECTRIC VALUES OF AN EARTH FORMATION AS A
FUNCTION OF POSITION WITHIN THE EARTH
FORMATION

INVENTOR: S. Mark Haugland

ATTY DKT NO: H052722.0029US0

12 / 13

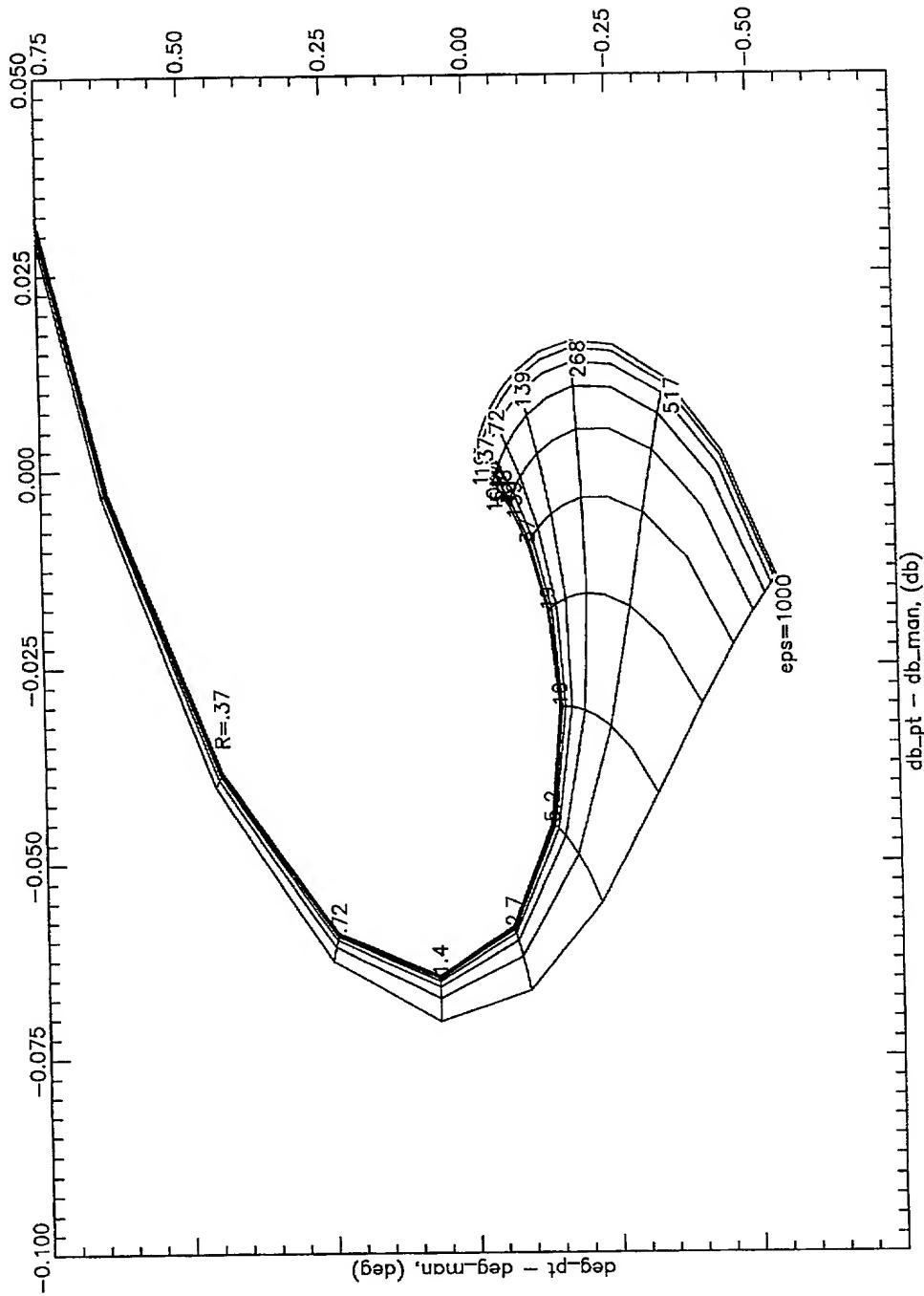


Figure 12. 2 MHz, Medium Measurement, 7.00 Mandrel

TITLE: METHOD OF DETERMINING RESISTIVITY AND/OR DIELECTRIC VALUES OF AN EARTH FORMATION AS A FUNCTION OF POSITION WITHIN THE EARTH FORMATION
INVENTOR: S. Mark Haugland
ATTY DKT NO: H052722.0029US0

13 / 13

Comparison of Point Dipole, Mandrel, and Corrected Responses in a Homogeneous Medium.
2 MHz, Medium Measurement, 7.00 Mandrel

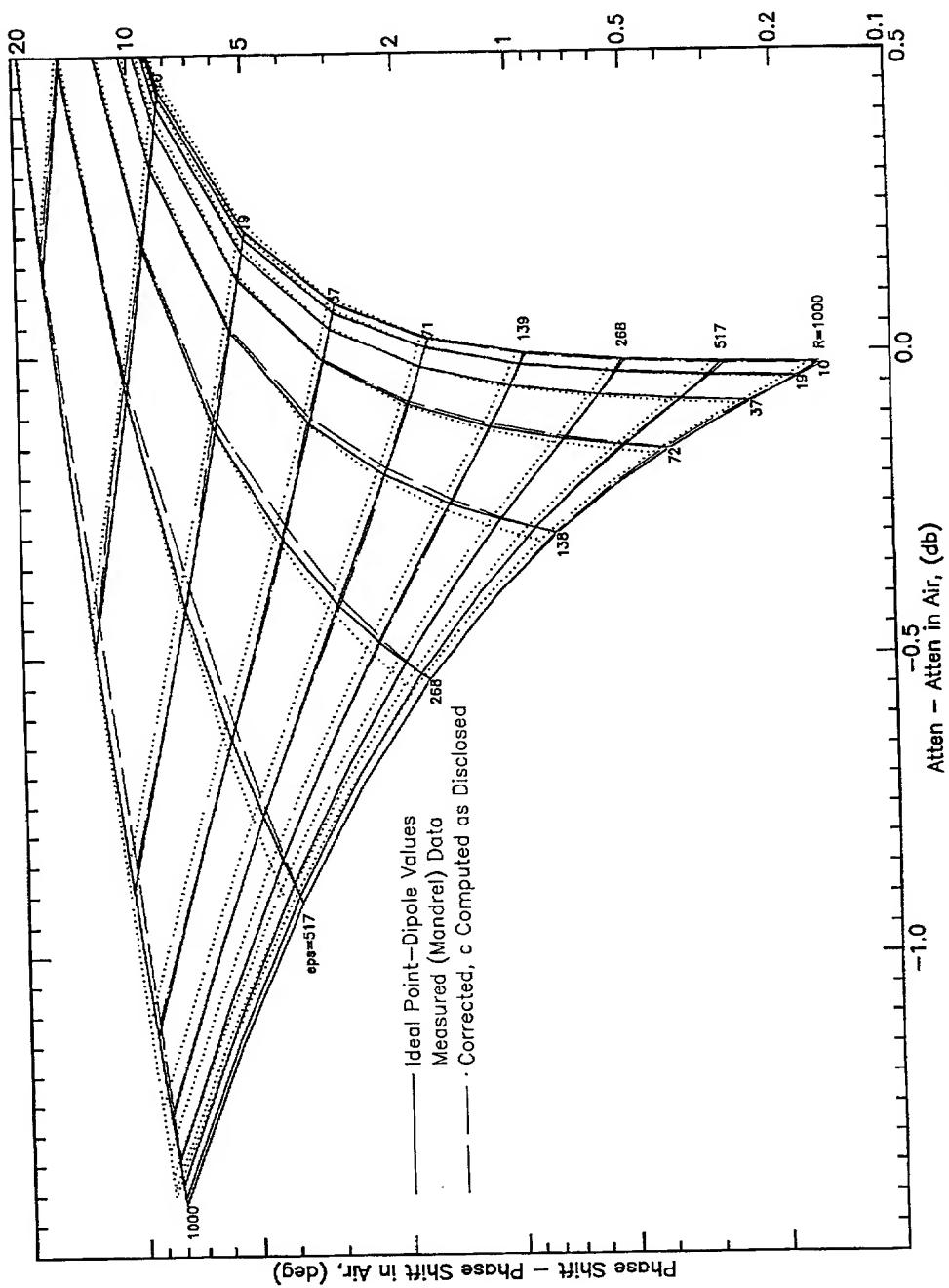


Figure 13. Comparison of point-dipole, measured (mandrel) data, and c computed as disclosed.